UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/583,641	03/27/2007	**Julien Gatineau**	Serie 6397	3727

40582 7590 03/19/2009

AIR LIQUIDE
Intellectual Property
2700 POST OAK BOULEVARD, SUITE 1800
HOUSTON, TX 77056

EXAMINER	
BLAN, NICOLE R	

ART UNIT	PAPER NUMBER
1792	

MAIL DATE	DELIVERY MODE
03/19/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/583,641	GATINEAU ET AL.	
	Examiner	Art Unit	
	NICOLE BLAN	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 December 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *11-16 and 18-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *11-16 and 18-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. The amendments to claims 11 and 18 as well as the cancellation of claim 17 filed on December 3, 2008 have been acknowledged. Claims 11-16 and 18-20 are currently pending.

2. In view of the amendments to the claims, the previous rejection under 35 U.S.C. 112, second paragraph is withdrawn.

Response to Arguments

3. Applicant's arguments filed December 3, 2008 have been fully considered but they are not persuasive.

4. In response to applicant's argument regarding '461 failing to exhaust off the reducing gas, the Examiner does not find this persuasive. '461 teaches a process that introduces a gas comprising both a reducing gas and an oxidizing and that the chamber comprises a vacuum pump which constantly evacuates the gases from the chamber as is further evidenced at col. 13, lines 16-20 in which it is described that a sample is removed from the pipe above the vacuum pump [see Fig. 12] indicating that the gases are removed from the system. As such, '461 teaches a mixture of gases being constantly removed from the system. Since the reaction of converting the metal into volatile oxide is subsequent to the reaction of converting the solid oxide into metal, and since the gases are constantly exhausted, the claimed limitations are met. Furthermore, the claims do not exclude simultaneously exhausting both the reducing gas as well as the oxidizing gas. The chemical reaction are in the same sequence as instantly claimed, and in the absence of unexpected results, the sequence of adding the reagents together or in sequence is obvious. Therefore, '461 teaches the claimed limitations.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

8. Claims 11, 13-16 and 18 are rejected under 35 U.S.C. 102(e) as being anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Nakahara et al. (U.S. Patent 6,537,461, hereinafter '461).

Claim 11: '461 teaches a method for cleaning a CVD reactor [reads on "film-forming apparatus"] in order to remove a ruthenium-type deposit residing on the chamber with in the reactor after the reactor was used to form a film ruthenium oxide, wherein the chamber of the reactor comprises ruthenium oxide [col. 3, lines 6-67; col. 4, lines 1-39], said method being characterized by converting RuO_2(s) and Ru(s) to the volatile RuO_4(g) by contacting with ozone and a reducing gas such as hydrogen. Since RuO_2(s) does not react easily with ozone, it is first converted to Ru(s) by the reducing gas, and then reacted with ozone to form RuO_4(g). The volatile RuO_4(g) is then removed from the chamber. '461 teaches that the chamber comprises a vacuum pump which evacuates the gases from the chamber as is further evidenced at col. 13, lines 16-20 in which it is described that a sample is removed from the pipe above the vacuum pump [see Fig. 12] indicating that the gases are removed from the system. As such, '461 teaches a mixture of gases being removed from the system, and the claims do not exclude simultaneously exhausting; therefore, '461 reads on the current claimed limitations. See at least: col. 3, lines 64-67; col. 4, lines 1-49; Example 3 running from cols. 12-14.

Furthermore, even if the reference to '461 is removed from the scope of 35 U.S.C. 102(e) rejection with regard to claim 1, one skilled in the art would still obviously achieve the same result namely that being cleaning a film-forming apparatus because even thought the reducing gas and the oxidizing gas are introduced together, they will react in a certain sequence. The method of the prior art removes ruthenium oxide contamination by turning it into solid

ruthenium and oxidizing ruthenium to a volatile ruthenium oxide (same reactive sequence as claimed) and no unexpected results have been achieved by introducing the gases in sequence as instantly claimed. Therefore, the selection of any order of performing process steps is *prima facie* obvious in the absence of new or unexpected results. *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946). *In re Gibson*, 39 F.2d 975, 5 USPQ 230 (CCPA 1930).

Claims 13 and 16: The method of claim 11, in which '461 also teaches that the temperature during the cleaning process was about 150 ^{o}C to ensure satisfactory etching [col. 13, lines 5-8 and 53-58].

Claim 14: The method of claim 11, in which '461 also teaches that the gas pressure was at 100 Torr [col. 13, lines 14-15].

Claim 15: The method of claim 11, in which '461 also teaches that the oxidizing gas comprises ozone-containing oxygen gas that originated from an ozonizer [reads on "ozone generator"; col. 7, lines –14; col. 14, lines 1-11].

Claim 18: The method of claim 11, in which '461 also teaches that detection of cleaning endpoint was made by providing a sampling point and measuring changes in the ion intensity [reads on "concentration"] of reaction product gas generated during the cleaning [col. 13, lines 16-19] and that the time when the change in the intensity became very small due to increasing

ion intensity of RuO_4 (volatile ruthenium oxide) was deemed to be a cleaning endpoint [col. 13, lines 20-22].

9. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over '461 as applied to claim 11 above, and further in view of Jelenkovic et al. (Degradation of RuO_2 thin films in hydrogen atmosphere at temperatures between 150 and 250 ^oC).

Claim 12: '461 teaches the limitations of claim 11 above. '461 teaches that a mixture of an ozone-containing oxygen gas is further admixed with a reductive gas such as hydrogen as discussed in claim 11 above, but '461 does not explicitly teach the amount of hydrogen in the reducing gas. However, Jelenkovic teaches that a reducing gas comprising 1% hydrogen is effective in reducing RuO_2 (solid ruthenium oxide) to Ru (ruthenium metal) on [abstract; page 50 under the *Experiment* section]. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the amount of hydrogen taught by Jelenkovic in the method of cleaning disclosed by '461 with a reasonable expectation of success because Jelenkovic teaches that it is a suitable amount for reducing RuO_2 to Ru.

10. Claims 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over '461 as applied to claim 11 above, and further in view of Phillips et al. (U.S. Patent 6,458,183, hereinafter '183).

Claim 19: '461 teaches the limitations of claim 11 above. '461 does not explicitly teach heating the $RuO_4(g)$ gas stream flowing out of the reactor. However, '183 teaches heating $RuO_4(g)$ in a collection vessel to convert the volatile product ($RuO_4(g)$) into $RuO_2(s)$ [col. 5,

lines 5-10]. It would have been obvious to one of ordinary skill in the art at the time the invention was made to heat the vessel containing the volatile ruthenium oxide to decompose it into a less harmful substance for an easier and more eco-friendly disposal.

Claim 20: '461 teaches the limitations of claim 11 above. '461 does not explicitly teach contacting the $RuO_4(g)$ containing stream with a decomposition catalyst comprising either Ru(s) or $RuO_2(s)$ in order to decompose $RuO_4(g)$. However, '183 teaches heating $RuO_4(g)$ in a collection vessel to convert the volatile product ($RuO_4(g)$) into $RuO_2(s)$ [col. 5, lines 5-10]. Once the initial particles begin to change into $RuO_2(s)$, they will adhere to the wall [reads on "catalyst"]. The particles that first adhere to the wall will become the catalyst for the rest of the $RuO_4(g)$ steam that enters the vessel. Therefore, the gas stream is converted to a solid product for an easier and less harmful disposal. It would have been obvious to one of ordinary skill in the art at the time the invention was made to heat the vessel containing the volatile ruthenium oxide to decompose it into a less harmful substance for an easier and more eco-friendly disposal.

Conclusion

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period

will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NICOLE BLAN whose telephone number is (571)270-1838. The examiner can normally be reached on Monday - Thursday 8-5 and alternating Fridays 8-4.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on 571-272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Nicole Blan/
Examiner, Art Unit 1792

/Alexander Markoff/
Primary Examiner, Art Unit 1792